Albani V, Butler LT, Traill WB, Kennedy OB.

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***Appetite* 2017**

DOI: https://doi.org/10.1016/j.appet.2017.09.018

Accepted Manuscript

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PII: S0195-6663(17)31077-2

DOI: 10.1016/j.appet.2017.09.018

Reference: APPET 3620

To appear in: *Appetite*

Received Date: 24 July 2017

Revised Date: 19 September 2017

Accepted Date: 20 September 2017

Please cite this article as: Albani V., Butler L.T., Traill W.B. & Kennedy O.B., Understanding fruit and vegetable consumption in children and adolescents. The contributions of affect, self-concept and habit strength, *Appetite* (2017), doi: 10.1016/j.appet.2017.09.018.

Understanding fruit and vegetable consumption in children and adolescents. The contributions of affect, self-concept and habit strength

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Financial Support

This work was supported by a University of Reading and a UK Food Standards Agency doctoral studentship (grant number PG1015) to Viviana Albani under the supervision of Laurie T. Butler, Orla B. Kennedy and W. Bruce Traill. The sponsor had no role in the study design, in the analysis and interpretation of findings nor in the decision to submit the manuscript for publication.

Authorship

V.A. reviewed the literature, prepared and analysed the data and wrote the first draft. L.B., O.K. and W.B.T. provided conceptual contributions, statistical advice, and contributed to the manuscript.

Ethical Approval

Ethical approval for this study was granted by Reading University Ethics and Research Committee.

Conflict of Interest

The authors declare that they have no conflict of interests.

Abstract

Affective processes and the role of automaticity are increasingly recognised as critical in determining food choice. This study investigated the association of affective attitude, self-identity and habit with fruit and vegetable (FV) intentions and intake in children. Previous studies have not fully explored their implications for children of different age groups and have not considered their independent contribution as part of a coherent model of behaviour that also controls for other psychosocial and environmental determinants of intake. Data was collected through face-to-face interviews with 362 children, 9 to 15 years old. Children were asked to report on measures of affective attitude, cognitive attitude, self-concept, social norms and facilitating factors following Triandis' Theory of Interpersonal Behaviour (TIB). Three stage least squares was used to estimate the independent association of affective attitude and self-concept with intentions and of intentions and habit with intake. Self-concept had the most prominent role in explaining intentions irrespective of age for both fruit and vegetables. The importance of affective attitude varied by age and with fruit and vegetables, with greater importance for vegetables and for children aged 11 to 13 years. Cognitive attitude was more relevant than affective attitude for 14 to 15 year-olds' fruit intentions. Intake was more strongly associated with habit than intentions, with stronger associations for 14 to 15 year-olds. The current findings support the importance of self-concept for FV motivations and provide further evidence on the importance of habit to FV intake in young and older children and adolescents. Results also support a targeted usefulness of affective attitude for fruit and vegetable intentions. The discussion considers potential ways in which these constructs can be incorporated into interventions to increase FV intake in children.

Introduction

Determinants of children's fruit and vegetable consumption

Several studies have shown that children can enjoy present and future health benefits from diets rich in daily fruit and vegetable (FV) intakes (Berenson, et al., 1998; Dauchet, Amouyel, & Dallongeville, 2009; Prynne, et al., 2006). Part of these benefits are due to the fact that preferences for FV acquired during the early years translate into healthier dietary habits in adulthood (Craigie, Lake, Kelly, Adamson, & Mathers, 2011). However, children's and adolescents' FV intake in high income countries is low compared to the 5 portions a day recommendation with, for example, intake of 11 to 18 year-olds in the UK estimated at 2.8 FV portions/day, and intake of 3 to 17 year-old girls and boys in Germany between 2.7 and 2.4 portions/day respectively (Bates, et al., 2016; Borrmann & Mensink, 2015; Kim, et al., 2014; Yngve, et al., 2005). It is therefore important to understand the correlates of children's FV consumption. This study explores factors associated to children's and adolescents' FV intake, specifically the role of affective attitude, self-concept and habit.

Knowledge about what drives children's FV intake comes mainly from applications of social cognition models in which behaviour is linked with individuals' beliefs about themselves, about the behaviour and about their environment (Michela & Contento, 1986; Michela & Wood, 1986). This research has identified a range of environmental and psychosocial correlates of FV consumption in children and adolescents, such as accessibility of FV at the home and school environments (Pearson, Biddle, & Gorely, 2009; Van Der Horst, et al., 2007), behaviour modelling, and intention to eat healthy (Backman, Haddad, Lee, Johnston, & Hodgkin, 2002; Geller & Dzewaltowski, 2009; McClain, Chappuis, Nguyen-Rodriguez, Yaroch, & Spruijt-Metz, 2009); and correlates of intentions such as parental subjective norms, perceptions of barriers (Backman, et al., 2002; Fernandes-Machado, Gellert, Goncalves, Sniehotta, & Araujo-Soares, 2016), self-efficacy (Corwin, Sargent, Rheaume, & Saunders, 1999; Domel, et al., 1996; Granner, et al., 2004; Kristjansdottir, et al., 2006; Resnicow, et al., 1997; Reynolds, Hinton, Shewchuk, & Hickey, 1999) and attitudes expressed as outcome expectations ("To eat fruit every day gives me more energy" and "To eat fruit every day makes me feel good") (Dennison & Shepherd, 1995). (Lien, Lytle, & Komro, 2002)Nonetheless, important questions remain about the ability of these models to characterise children's FV intake. In particular, children's food intake intentions and behaviours may be less mediated by cognitive persuasion (such as information processing) (Kirscht, 1983) and more by affective factors or habitual and learned responses (Bower & Sandall, 2002; Fischhoff, 2008; Köster & Mojet, 2007; Martens, van Assema, & Brug, 2005; McClain, et al., 2009; Reinaerts, de Nooijer, Candel, & de Vries, 2007; D. Spruijt-Metz, 1999; Steinberg, 2005). For example, the study of Lien et al. (2002) used the Theory of Planned Behaviour (TPB) to explain FV intentions and self-reported intake amongst 12 to 13 year-

olds and found direct influence of health outcome expectancies on intentions to eat FV, but low explanatory power from these type of attitude constructs.

The affective component of attitude refers to the feelings that individuals attach to a behaviour or to an attitude object, and because of these associations, individuals can be asked to rate behaviours as pleasant or unpleasant, enjoyable or disgusting, etc. (Triandis, 1980: 211-18)[1]. The distinction between affective attitude and cognitive attitude is increasingly emphasized as important in the study of intentions from the recognition that feelings may play a separate and additional contribution in motivating intentions to that of cognitively processed aspects of behaviour (e.g. traits) (see Mark Conner, McEachan, Taylor, O'Hara, & Lawton, 2015). Research in adult populations comparing the influence of both cognitive and affective attitudes on intentions has shown affective attitudes to be strongly associated with intentions for a range of protective and risk health behaviours (French, et al., 2005; Lowe, Eves, & Carroll, 2002). For children, the influence of affective attitudes on intentions may be stronger than in adults because children have not yet fully developed the cognitive abilities to comprehend abstract concepts such as nutrition and health, and to consider the future consequences of their actions (Doherty & Hughes, 2009; Steinberg, et al., 2009). Indirect evidence of the potential contribution of affective attitude to better explaining children's FV intentions is seen in the work of Murnaghan et al. (2010), where the authors achieved strong associations with intentions in a TPB model that included measures of affective attitude as part of the global attitude construct. More recently, a randomized control trial study looking at affective and instrumental attitudes and adolescents' FV intake found that changes in affective attitude influenced FV intentions and self-reported FV intake, and that this effect was stronger than that for instrumental attitudes (Carfora, Caso, & Conner, 2016). Affective responses to a food may also be influenced by the meanings assigned to that food (Donna Spruijt-Metz, 1995) including signalling self-concept (Bisogni, Connors, Devine, & Sobal, 2002; M. Conner & Armitage, 2002). A meta-analysis of studies exploring the role of self-identity in research with adults showed a strong correlation between self-concept and intentions (r =0.47), with this variable explaining between 6% and 9% of the variance in intentions after accounting for the effect of attitudes, norms, perceptions of control and past behaviour (Rise, Sheeran, & Hukkelberg, 2010). In adolescents Wilson et al. (2002) found high correlations (r=0.67, p<0.05) of self-concept associated to eating more FV and changes in FV intake from three-day diary records. In younger children the relevance of self-concept may be attenuated by the fact that children have a less developed ability to define their self-concept (i.e. who they are) in the same way as adolescents and adults. However, by the age of eight years children have a developmental structure of "self" that allows them to hold more or less accurate representations of personal traits and underlying competencies (see Marsh, Ellis, & Craven, 2002). Exploring the role of

[1] We make the distinction here from affective states (emotions or mood). For example, affective states can be elicited by the remembered feelings associated with a behaviour (Cohen and Areni 1991:191)

self-concept in children's FV intentions may therefore provide useful insights for the understanding of factors driving healthier eating in younger and older children.

Children's food choices may also be habitual or involving little cognitive mediation. Research with adults suggests that food choices may hold an important component of automaticity or habit as a result of the repetition of food choice decisions over time (van't Riet, Sijtsema, Dagevos, & De Bruijn, 2011). Habits have been found to be consistently and positively related to fruit and vegetable intake in several studies with adult populations (Guillaumie, Godin, & Vézina-Im, 2010). Children's automaticity or habit in food choices may arise from repetition of behaviours in stable contexts (Wood & Neal, 2009), such as during family meals. Processes of learning that result in disassociation of motives and behaviours could also underlie habitual FV behaviours in children (Köster & Mojet, 2007). The exploration of the role of habits in children's FV has been less extensive than in adults, but so far results seem promising. In a study of 4 to 12 year-olds in the Netherlands, Reinaerts et al. (Reinaerts, et al., 2007) found that strength of habit as reported by the children's parents was the strongest predictor of fruit and of vegetable intake; while in a study of Italian adolescents Canova and Manganelli (Canova & Manganelli, 2016) found that the consumption of fresh fruit and vegetables as snacks was influenced by both intentions and habit.

Differences with age in determinants of children's fruit and vegetable consumption

Evidence suggests that children of different ages are not a homogeneous group in terms of their FV consumption, with teenagers at higher risk of lower consumption (Albani, Butler, Traill, & Kennedy, 2017; Bridges, 2012). Possible explanations for these demographic differences are differences in motivations and facilitating conditions across groups. With age children are increasingly able to comprehend abstract concepts such as nutrition and health, to consider the future consequences of their actions, and to perceive and focus on social norms (Miller, 2011; Nguyen, Gordon, & McCullough, 2011; Steinberg, et al., 2009; Tilston, Gregson, Neale, & Douglas, 1991). This progress has implications for children's food choice behaviours. Although only a limited number of studies compare factors associated with FV intake in both children and adolescents, considering the benefits of eating more FV was found to be a significant predictor of FV intake in children aged 13 to 15 years, but not for children aged 11 to 12 years (Zabinski, et al., 2006). Interestingly, greater reliance on social norms and cognitive processes/deliberation of consequences for making choices may mean a reduced role for affect (Nicklaus & Issanchou, 2007; Triandis, 1977). Yet the influence of self-concept for individual choices may be more relevant for older children and adolescents, not only because of children's increasingly sophisticated ability with age for self-appraisal and introspection, but also because during adolescence the search for self-identity is important and self-identity motivations gain relevance in behavioural choices (Marcia, 2001; D. Spruijt-Metz, 1999). The potential relevance of habit for FV intake may also vary with age. Adolescents have reported established eating habits as a barrier to improving diet or as a factor explaining their food choices

(Neumark-Sztainer, Story, Perry, & Casey, 1999). Yet food habits can be disrupted when eating environments change, either physically or socially, and changes in eating environments and experimentation with food in non-family social contexts are more common during adolescence than during childhood (Truswell & Darnton-Hill, 1981).

The specific objective of this study was to explore differences between children and adolescents in the importance for FV intentions and consumption of affective attitude, self-concept and habit. Understanding the differences in motivations and facilitating conditions in children of different age groups is a relevant aim of the literature on children's determinants of FV intake, as this type of information can serve to inform targeted interventions to promote FV consumption (Diep, Chen, Davies, Baranowski, & Baranowski, 2014).

Theoretical framework

The study applies Triandis' Theory of Interpersonal Behaviour (TIB) (Triandis, 1977) to explore the influence of affective attitude, self-concept and habit on children's FV consumption. As in the Theory of Reasoned Action (TRA) and the TPB (Ajzen, 1985; Ajzen & Fishbein, 1970), in the TIB intentions are assumed to mediate between attitudes and behaviours, but the TIB predicts that behaviour is in addition a function of habit and a set of facilitating conditions that constrain or encourage intentional and habitual behaviours. The TIB also specifies separate effects on intentions from cognitive and affective attitude and from self-concept. Fishbein and Ajzen (2010) discourage the use of certain measures of self-concept in a TPB framework because of potential overlap with other model constructs (attitudes, social norms and past behaviour). Nonetheless, this construct is understood and operationalized in the TIB as a salient aspect of one's self, which is less likely to correlate with evaluative judgments and social norms (Caso, Carfora, & Conner, 2016). The TIB has fared well in studies looking into intentions for a diversity of health and non-health behaviours (Boyd & Wandersman, 1991; Feola & Binder, 2010). When predicting self-reported behaviour, Valois, Desharnais and Godin (Valois, Desharnais, & Godin, 1988) supported the application of the TIB in virtue of the possibility to better discriminate motivating influences and the importance of habit in accounting for behaviour (see also Montano, 1986).

The affective component of intentions in the TIB refers to the feelings attached to the behaviour (feelings of pleasure and enjoyment or of displeasure and disgust) (Triandis, 1980:211). The cognitive component includes the perceived consequences of the behaviour. Besides affective and cognitive attitudes, the TIB includes social factors as determinants of behavioural intention. Social factors thought to influence behaviour include social norms or rules of behaviour (beliefs about the appropriateness, correctness, desirability and morality of ways of behaving in a group) and contractual arrangements (specific plans detailing time, place, social actors, etc.). Although eating behaviour is very much institutionalised (e.g. times of the day, types of foods, etc), variables capturing specific

social arrangements were not included. Triandis further suggests a dimension of personal morality within the TIB social factors (Triandis, 1980:218), but this item was not included in the analyses since it was not expected that FV intake would have a strong moral dimension (see Mark Conner & McMillan, 1999). Self-concept[2] is included in the battery of social influences in the TIB. It is hypothesized to influence behavioural intentions because acting a behaviour congruent with the self-concept helps individuals develop positive self-evaluations, and because people are assumed to be able to discriminate across different behaviours those compatible with their self-concept (Stets & Burke, 2000; Triandis, 1977).

The model predicts stronger intentions to act given more positive affect, more positive evaluation of consequences, and stronger norms and self-concept in favour of the behaviour. At the same time, intentions will be guided by affective motivations when social pressures or consequences of actions are less important, when there are time constraints and when individuals are impulsive (Triandis, 1977:197). The TIB also predicts that personal differences and the level of novelty of a (social) situation, i.e. how much the situation resembles situations which have occurred in the past, determine the relative importance of habit against intention in predicting behaviour.

Summary

Taking into account the predictions of the TIB, the existing evidence on determinants of children's and adolescents' FV intake, and children's developmental stages, it was expected that affective attitude would be more important than cognitive attitude in explaining children's FV intentions. It was also expected that the association of intentions with cognitive factors would be stronger for older compared to younger children. A gradient with age was also expected for the strength of the association of self-concept with intentions. We did not have any *a priori* expectations for the association of habit strength and FV intake by children's age. The age group under study were children between the age of nine and 15 years.

Methods

Measures

Scales for the TIB constructs were drafted based on guidelines in Triandis (1977), other empirical studies detailing the behavioural and psychosocial measures of interest (Icek Ajzen, 2002), and a literature review. In order to discriminate the most age-appropriate scales from those found in the literature, one-to-one interviews with children aged 9 to 10 and a pilot survey (n=28) with 9 to 15 year-olds were conducted between May and July 2012. The pilot survey interviewed children at two

[2] Triandis argues that individuals can derive their self-concept from their perceptions of what important others think as inferred from their behaviour towards them, and as such it is classified in the TIB as a social influence.

time points one week apart to examine the test-retest reliabilities of scales and other potential problems with question wording. More detail on the procedure of the pre-testing interviews and the pilot survey can be found in the online supplementary material.

The target behaviour for the psychometric scales was the consumption of "two or more portions of fruit a day", and the consumption of "three or more portions of vegetables a day" (Herbert, 2010:94; Morland, Wing, & Roux, 2002)[3]. The questionnaire included measures for fruit and vegetables separately. Fruit intake excluded fruit juice and focused on whole fruits only to limit the length of the questionnaire. Items were organised in sections corresponding to the different TIB constructs, with questions on fruit being followed immediately by parallel items on vegetables. Scales excluded the "don't know" option *a priori* to avoid response tendencies towards no opinion common in the age groups being surveyed (see Krosnick, et al., 2002).

Fruit and vegetable intake. A version of the brief food frequency questionnaire (FFQ) (Cullen, Baranowski, Baranowski, Hebert, & de Moor, 1999) was used to assess children's and adolescents' FV intake. Children were asked to report the number of portions of fruit and of vegetables they normally ate in a week (less than 1, between 1 and 2, between 3 and 4, between 5 and 6, 7 a week/1 a day, and more than 7 a week/more than 1 a day). If the child reported eating more than 1 portion a day, a follow-up question asked about the number of portions normally eaten in a day (two, three, four, five or more). The two items were re-coded into a single intake measure with the whole range of options leading to nine response categories (less than 1 portion a week – five or more portions a day). Children were instructed to think about fresh, dried, tinned and frozen fruit; and to think about salad and other raw vegetables, cooked vegetables and tinned vegetables following inclusion criteria in the 5-a-Day recommendation[4] . To facilitate comprehension and standardise responses, children were shown picture cards with examples of what counts as a portion of fruit and as a portion of vegetables (separately) taken from the "What counts guide" of the UK official 5-a-Day website[4].

Habit. Habit strength for FV intake was measured through responses to a version of the Self-Report Habit Index (Verplanken & Orbell, 2003), which addresses the level of automaticity of the behaviour as a measure of habituation, as well as aspects of repetition and personal identity. Items selected for the questionnaire were those referring to automaticity and repetition, and in particular those regarding routine and efficiency, following the approach of Reinaerts et al. (2007) and Triandis (1977:205). The

[3] Morland and her colleagues cite these recommendations as coming from the US Department of Agriculture and the US Department of Health and Human Services Dietary Guidelines for Americans. An inspection of existing documentation discusses the dietary recommendations for Americans also in terms of cups, suggesting at least two cups of fruits and 2.5 cups of vegetables a day.

[4] National Health Service. "5 A DAY: what counts?", Available from: http://www.nhs.uk/Livewell/5ADAY/Pages/Whatcounts.aspx.

self-identity dimension was excluded since the TIB already includes a measure of self-concept[5]. The three items to measure habit read "Eating fruit/vegetables every day is something..." "you do quite a lot", "you have been doing for a long time", "is something you do without thinking". Answers were coded on a four-point "disagree"(1) – "agree"(4) scale. Cronbach's α for the fruit scale ranged between 0.948 and 0.910 across the three age groups. Cronbach's α for the vegetables scale ranged from 0.901 to 0.968.

Intention. Intention was measured with one item asking children to agree or disagree with the statement "You plan to eat two or more portions of fruit/ three or more portions of vegetable every day" (I. Ajzen, 2002; Bratman, 1992:19) with four response options "disagree"(1) – "agree"(4).

Attitude. Given the age of the youngest target group of the study, a direct rather than an indirect measurement of attitudes was employed (I. Ajzen, 2002) to safeguard children's motivation and attention by keeping the questionnaire shorter and by simplifying the task by not forcing children to think about outcomes probabilities. The *cognitive component* was measured with the scale "bad idea"(1) – "good idea"(5) preceded by the question "In your case, how good or bad an idea is eating two or more portions of fruit a day/three or more portions of vegetables a day?" based on previous FV intake studies that have employed semantic scales with instrumental adjectives of the type "sensible – foolish" or "satisfactory – unsatisfactory" (Lally, Bartle, & Wardle, 2011; Povey, Conner, Sparks, James, & Shepherd, 2000b). Test-retest reliability for these items was modest: fruit r=0.126, vegetables r=*0*.55. The *affective component* was assessed by asking children how enjoyable they would find it to eat two or more portions of fruit/three or more portions of vegetables on a daily basis on a scale "not enjoyable"(1) – "enjoyable"(5) (Triandis, 1980:211,218) (test-retest reliability: fruit r=0.78, vegetables r=*0*.85).

Social norms were measured with items tapping into levels of approval from reference groups and modelling behaviour of others (Triandis, 1977:18,55). Reference groups included parents and peers as both exercise influence in children's eating behaviours (Patrick & Nicklas, 2005) and were divided into injunctive norm (what others believe) and descriptive norm (what others do).The *injunctive norm* item was phrased "As far as you know, do your parents (friends) like you eating three or more portions of vegetables a day" with a parallel item for fruit and response scales "they don't like it at all"(1) – "they like it"(5). The *descriptive norm of parents* aimed at capturing parental modelling of FV behaviour ("As far as you know, your parents eat two or more portions of fruit a day"), the *descriptive norm of peers* was phrased in terms of the normative behaviour (Lally, et al., 2011; Patrick & Nicklas, 2005; Vereecken, Van Damme, & Maes, 2005) as "As far as you know, most of your

[5] See also Gardner, B., de Bruijn, G.J., and Lally, P. (2012). Habit, identity, and repetitive action: a prospective study of binge-drinking in UK students. *British Journal of Health Psychology, 17(3),* 565-581., for a study on the distinction between habit and identity.

friends eat fruit every day". Both descriptive norm questions used "disagree"(1) – "agree"(4) scale. Test-retest reliability ranged between *r*=0.47 (fruit descriptive norm of friend) and *r*=0.97 (vegetable injunctive norm of parents) with the majority of values above 0.70.

Self-concept was based on one item measuring the level of personal importance of behaviour (Markus, 1977) worded as "How important is it to you to eat two or more portions of fruit a day", with a parallel item for three portions of vegetables. Answers were coded on a five-point scale "not important"(1) – "very important"(4). This scale was used after one-to-one interviews revealed that the youngest children in the sample did not correctly interpret the meaning of a more commonly used measure self-concept ("I am the kind of person that eats two or more portions of fruit/three or more portions of vegetables every day") (Gardner, de Bruijn, & Lally, 2012; Triandis, 1977) but were able to comprehend a measure of self-concept based on importance as above. The question included a brief introduction [6]aimed at reducing social desirability bias by highlighting the appropriateness of answering at both ends of the scale (Fowler, 1995). Test-retest reliability was *r*=0.91 for fruit and *r=0.*84 for vegetables.

Facilitating factors were assessed using measures of *perceived behavioural control* (PBC) and *self-efficacy* for eating FV as measures of controllability over behaviour and perceptions of personal capabilities (Icek Ajzen, 2002; Povey, Conner, Sparks, James, & Shepherd, 2000a; Triandis, 1977). Self-efficacy beliefs were measured with one item asking children how difficult or easy it would be to eat two or more portions of fruit/three or more portions of vegetables a day with responses coded as "very difficult"(1) – "very easy"(5). PBC was measured with two items differentiating the home and school environment "At home/At school, whenever you want to eat fruit/vegetables you can do it" with response scales "never"(1) – "always"(5). Test-retest reliability for the different facilitating factor items were all greater than 0.75.

Demographic characteristics. Socioeconomic status of the household was measured using the UK Market Research Society's social grades scale (The Market Research Society, 2006) grouped into manual and non-manual occupation households. Other items included child's ethnicity (white, non-white), age, geographical location, and take up of free school meals.

Sample

Face-to-face interviews across England, Scotland and Wales took place during the school term between October 2012 and February 2013. Sampling was done by age quotas, within gender and socioeconomic grade (Manual and Non-Manual households, according to the ABC1 and the C2DE UK Market Research Society's social grades scale). Interviews were carried out in the children's

[6] The introduction to the question read: "Everyone is different about the things they feel are important to them. For example, some people feel it is very important to them to eat fruits and vegetables, others feel it is not important to them. In your case, can you tell me…"

homes[7]. Ethical approval was granted by the University of Reading Ethics and Research Committee. Study information sheets were provided to participants and written consent was sought from parents[8].

A total of 362 questionnaires were collected. After excluding missing values in the intake and intention variables and extreme intake values (identified at two standard deviations from the mean, equivalent to consuming nine portions of fruit/vegetables a day), there were 345 complete observations on fruit intake and intentions, and 340 on vegetable intake and intentions. Total sample sizes for analyses was lower than these values, however, given missing values in other TIB constructs. The largest share of non-responses occurred in the social norm constructs, particularly questions referring to friends' behaviours and opinions (26% and 30%, descriptive norm for fruit and vegetables, respectively) and in variables referring to the school environment, where almost the totality of non-responses came from children not taking school meals (8% - 11% of responses). To avoid losing up to one third of sample observations the PBC at school variable was dropped from analyses, and the social norm variables were re-coded to indicate if the child provided a response or not, i.e. "provided a response"(1) - "not provided a response"(0)[9]. The Total sample size for analyses after excluding the missing values present in other TIB constructs (< 2%) was 332 for fruit and 325 for vegetables.

Model specification and statistical analyses

Categorical responses to intake of daily portions were recoded into frequencies per week (Lally, et al., 2011) as "less than 1 a week" into 0 portions, "between 1 and 2" into 0.2 portions, then 0.5, 0.8, 1, 2, 3, 4 and 5 portions for the remaining categories. Scales for the TIB were standardised using the mean for each age group. The estimation model for intake of daily portions included intention, habit and facilitating factors (perceived behavioural control and self-efficacy), which were included as linear predictors of intake. Intention was specified as a linear additive function of affective attitude, cognitive attitude, self-concept and social factors. In addition, because intention and intake were measured contemporaneously at the time of the survey, the intention equation included intake as one of its covariates, as children may have used the information about how much FV they ate to decide on their response to the intention to eat FV (Lawton, Conner, & McEachan, 2009). In this way, the regression equation for intention and the regression equation for intake represented a system of simultaneous equations with two endogenous variables (intention and intake) which were estimated using a three-stage-least-squares (3SLS) estimator (Garen, 1984; Greene, 2008). 3SLS

[7] Recruitment of participants and face-to-face interviews with children was done by the same company in charge of the pilot survey, Carrick James Market Research. Carrick James Market Research abides by the Market Research Society's Code of Conduct for work with children and young people, including UK Criminal Records Bureau checks on interviewers.

[8] The pilot survey and the full-scale survey followed the same procedure for contacting participants.

[9] Because the objective of the study was not to explore the influence of social norms on intentions, the direction of the effect was less important than accounting for the fact that children had (or not had) knowledge of what their friends and parents did and thought.

addresses as a first step the potential bias from the co-determination endogeneity of intentions and habit, and as a second step the possibility that both habit and intention are influenced by common unobserved factors at the individual level. More specifically, 3SLS tackles the inconsistency[10] of the estimators introduced by endogeneity in the intention and habit variables, and improves the efficiency of the estimate (size of standard errors) by including in the calculation of the variance-covariance matrix of the estimators the correlation across the errors of the system equations. All models controlled for geographic location, if the child took free-school meals, and socio-economic group of household. The model equations can be found in the online supplementary material. Analyses were done using Stata release 14 (StataCorp, 2015).

Results

Descriptives and bivariate correlations

The sample was evenly split between boys and girls, but there was a slightly higher proportion of non-manual households in the youngest group compared to the other two age groups (58% vs. 55%). About 80% of the sample was from a white ethnic background, and around two-thirds of children reported taking free school meals (Table 1).

Table 1. Demographic characteristics of the sample by age groups

	Fruit				Vegetables			
	Total	9 to 10	11 to 13	14 to 15	**Total**	9 to 10	11 to 13	14 to 15
	(332)	(102)	(130)	(100)	**(325)**	(100)	(124)	(101)
Boy	**50**	48	48	53	**49**	48	48	52
White background	**83**	89	83	78	**83**	90	81	79
Key stage 2 (5,6)	**35**	100	10	0	**34**	100	10	0
Key stage 3 (7,8,9)	**39**	0	89	12	**38**	0	90	11
Key stage 4 (10,11)	**27**	0	1	88	**28**	0	1	89
Manual SES (DE, C2)	**51**	42	55	55	**51**	42	55	54
Non-manual SES (C1, AB)	**49**	58	45	45	**49**	58	45	46
School meal (Yes)	**63**	65	65	58	**63**	66	65	58
North[a]	**37**	39	35	38	**37**	40	34	39
Midlands, East Anglia and Wales	**25**	25	26	22	**25**	25	26	25
Greater London	**15**	13	17	15	**14**	12	18	13
South[b]	**23**	23	22	25	**23**	23	23	24

All figures are percentage terms. [a]North refers to the north of Great Britain and includes Scotland, Yorkshire and the Humber, North East and North West. [b]Includes outer South East and the South West and the outer London Metropolitan Area

[10] In other words, that even with ever larger sample sizes the estimated coefficients contain an over- or underestimate of the true association between the independent and the dependent variable that is caused by the endogenous variable being correlated with the error term in the equation. See Greene (2008: 64)

Table 2 reports the mean and standard deviations and the correlation among the measured TIB constructs. Results by age group can be found in the online supplementary material. Results indicate that children in the sample were relatively positive about eating more fruits and vegetables, but had low mean intakes of daily portions of fruits and of vegetables. All theoretical constructs of intake showed a significant association, as did all constructs predictive of intention except for the normative variables. The strongest association with intake was for habit, followed by self-efficacy, for both fruit and vegetables. The strongest correlates of vegetable intentions were affective attitude and self-concept. For fruit intention, the most important correlates were self-concept and affective attitude, except for the 14-15 group, for which cognitive attitude showed a stronger association (online supplementary material).

Table 2. Descriptive statistics and correlations between constructs. Total sample. Fruit (N=332) and vegetables (N=325).

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1. Intention		0.45*	0.53*	-0.004	-0.04	-0.01	0.13*	0.56*	0.35*	0.50*	0.22*	0.48*
2. Cong.	0.55*		0.51*	-0.01	-0.04	0.08	0.05	0.38*	0.39*	0.41*	0.26*	0.40*
3. Affect.	0.42*	0.52*		-0.01	-0.03	0.09	0.03	0.41*	0.46*	0.52*	0.26*	0.54*
4. Pr. norm	-0.08	-0.08	-0.10		0.28*	0.34*	0.12*	0.01	-0.01	-0.02	-0.01	0.01
5. Fd. norm	-0.04	-0.03	-0.03	0.33*		0.11*	0.41*	-0.07	-0.01	-0.02	-0.003	0.009
6. Pr. beh.	-0.03	0.006	-0.01	0.38*	0.16*		0.21*	0.04	0.04	0.04	0.04	0.10*
7. Fd. beh.	0.13*	0.11*	0.05	0.14*	0.40*	0.23*		0.08	-0.02	0.01	0.008	0.07
8. Self	0.50*	0.41*	0.42*	0.01	-0.05	0.02	0.10*		0.30*	0.49*	0.20*	0.45*
9. Portions	0.33*	0.34*	0.43*	-0.05	0.06	0.03	0.03	0.30*		0.54*	0.28*	0.36*
10. Habit	0.43*	0.43*	0.41*	0.57*	-0.09*	-0.03	0.02	0.06	0.48*		0.31*	0.50*
11. PBCh	0.27*	0.27*	0.29*	0.32*	-0.04	0.04	0.02	0.08	0.35*	0.42*		0.31*
12. SE	0.50*	0.50*	0.52*	0.38*	-0.07	-0.02	0.005	0.03	0.38*	0.43*	0.35*	
Fruit												
Mean	3.0	4.2	4.1	0.96	0.8	0.95	0.7	2.9	1.2	9.9	4.3	4.1
Sd	1.1	1.0	1.1	0.2	0.4	0.2	0.4	1.1	1.0	2.8	1.0	1.1
(Min,Max)	(1, 4)	(1, 5)	(1, 5)	(0, 1)	(0, 1)	(0, 1)	(0, 1)	(1, 4)	(0, 4)	(3, 12)	(1, 5)	(1, 5)
Vegetables												
Mean	2.8	4.1	3.5	0.96	0.8	0.95	0.7	2.7	1.2	9.1	4.2	3.8
Sd	1.1	1.1	1.3	0.2	0.4	0.2	0.5	1.1	1.0	3.0	1.0	1.4
(Min,Max)	(1, 4)	(1, 5)	(1, 5)	(0, 1)	(0, 1)	(0, 1)	(0, 1)	(1, 4)	(0, 4)	(3, 12)	(1, 5)	(1, 5)

Correlations from Kendall rank correlation coefficient. Values for fruit below the diagonal and values for vegetables above the diagonal. Cong.: cognitive attitude. Affect.: affective attitude. Pr. norm: parents' injunctive norm (binary variable). Fd. norm: friend's injunctive norm (binary variable). Pr. beh.: parental descriptive norm (binary variable). Fd. beh.: friends' descriptive norm (binary variable). Self: self-concept. PBCh: perceived behavioural control at home. SE: self-efficacy. Correlations based on standardized variables. *p-value < 0.05

Table 3 reports the results of the 3SLS regressions for intentions and intake by age groups for fruit and vegetables. Cognitive attitude was a significant predictor of intentions only for 14 to 15 year-olds'

fruit intake. Affective attitude was significant for fruit intake only in 11 to 13 year-olds and marginally significant (p=0.104) for 9 to 10 year-olds. In contrast, affective attitude was associated to vegetable intentions in the two older age groups. Self-concept showed the most consistent association with intentions to eat fruit and intentions to eat vegetables, showing marginal statistical significance only for 11 to 13 year-olds' vegetable intentions (p=0.103).

The variable capturing children's ability to report on friends' fruit and vegetable behaviour showed a positive and significant association for older children's intentions, in particular for 11 to 13 year-olds' fruit intention and 14 to 15 year-olds' vegetable intentions (other results for these older age groups were marginally statistically significant). In contrast, reporting on parents' vegetable intake was negatively associated to intentions to eat fruit and vegetables in the youngest children, and vegetable intentions in the two other age groups, with the strongest association for 14 to 15 year-olds.

When looking at the importance of intention and habit for intake, results showed that habit was more important for fruit intake for the two older age groups, but it was relevant across the three groups for vegetable intake. Intentions were not associated to intake of fruit for any of the age groups, but yes for 11 to 13 year-olds' vegetable consumption. Self-efficacy, but not perceived behavioural control, showed an association with 11 to 13 year-olds' fruit intake. Self-efficacy was also predictive of 9 to 10 year olds' and 14 to 15 year-olds' vegetable intake.

Table 3. Correlates of fruit and vegetable intentions and intake by three age groups: 9 to 10 years, 11 to 13 years and 14 to 15 years

Intention		**Fruit**			**Vegetables**		
		Coef. (SE)	P>z	95% CI	Coef. (SE)	P>z	95% CI
Cognitive attitude	9 to 10	-0.01 (0.09)	0.932	-0.18, 0.17	0.13 (0.09)	0.138	-0.04, 0.31
	11 to 13	0.04 (0.09)	0.701	-0.15, 0.22	0.05 (0.06)	0.435	-0.07, 0.17
	14 to 15	**0.29 (0.08)**	**0.001**	**0.12, 0.46**	0.08 (0.07)	0.252	-0.06, 0.23
Affective attitude	9 to 10	0.29 (0.18)	0.104	-0.06, 0.64	0.12 (0.13)	0.345	-0.13, 0.37
	11 to 13	**0.33 (0.1)**	**0.001**	**0.13, 0.53**	**0.27 (0.11)**	**0.017**	**0.05, 0.49**
	14 to 15	-0.02 (0.12)	0.887	-0.24, 0.21	**0.32 (0.10)**	**0.001**	**0.13, 0.52**
Self-concept	9 to 10	**0.23 (0.1)**	**0.017**	**0.04, 0.41**	**0.37 (0.09)**	**<0.001**	**0.18, 0.56**
	11 to 13	**0.33 (0.11)**	**0.003**	**0.11, 0.56**	0.14 (0.09)	0.103	-0.03, 0.31
	14 to 15	**0.39 (0.08)**	**<0.001**	**0.23, 0.54**	**0.35 (0.08)**	**<0.001**	**0.21, 0.5**
Report injunctive norm-parents (yes/no)	9 to 10	-0.14 (0.34)	0.688	-0.8, 0.53	0.67 (0.5)	0.185	-0.32, 1.65
	11 to 13	-0.36 (0.44)	0.409	-1.22, 0.5	0.13 (0.2)	0.523	-0.26, 0.51
	14 to 15	-0.003 (0.28)	0.993	-0.55, 0.54	0.6 (0.39)	0.122	-0.16, 1.36
Report injunctive norm-friends (yes/no)	9 to 10	0.07 (0.18)	0.689	-0.28, 0.42	-0.16 (0.19)	0.403	-0.52, 0.21
	11 to 13	-0.13 (0.21)	0.529	-0.55, 0.28	-0.10 (0.13)	0.429	-0.35, 0.15
	14 to 15	0.22 (0.18)	0.235	-0.14, 0.58	-0.11 (0.17)	0.496	-0.44, 0.21
Report descriptive norm-parents (yes/no)	9 to 10	**-0.55 (0.26)**	**0.038**	**-1.07, -0.03**	**-0.72 (0.3)**	**0.016**	**-1.31, -0.13**
	11 to 13	-0.11 (0.4)	0.788	-0.89, 0.68	-0.53 (0.28)	0.061	-1.09, 0.02
	14 to 15	-0.44 (0.29)	0.126	-0.998, 0.12	**-1.03 (0.31)**	**0.001**	**-1.636, -0.41**
Report descriptive norm-friends (yes/no)	9 to 10	0.2 (0.14)	0.151	-0.07, 0.48	0.14 (0.16)	0.361	-0.16, 0.45
	11 to 13	**0.36 (0.18)**	**0.04**	**0.02, 0.02**	0.24 (0.13)	0.062	-0.01, 0.48
	14 to 15	0.23 (0.14)	0.109	-0.05, 0.5	**0.49 (0.13)**	**<0.001**	**0.23, 0.75**
Portions	9 to 10	0.44 (0.34)	0.197	-0.23, 1.11	**0.56 (0.27)**	**0.040**	**0.02, 1.09**
	11 to 13	0.17 (0.23)	0.461	-0.28, 0.61	**0.63 (0.22)**	**0.005**	**0.19, 1.07**
	14 to 15	**0.52 (0.24)**	**0.028**	**0.05, 0.98**	0.17 (0.15)	0.246	-0.12, 0.47
Portions		**Fruit**			**Vegetables**		
		Coef. (SE)	P>z	95% CI	Coef. (SE)	P>z	95% CI
Intentions	9 to 10	0.31 (0.21)	0.149	-0.11, 0.72	0.05 (0.18)	0.797	-0.31, 0.41
	11 to 13	0.22 (0.17)	0.198	-0.11, 0.55	**0.41 (0.18)**	**0.021**	**0.06, 0.75**
	14 to 15	0.16 (0.12)	0.178	-0.07, 0.39	0.17 (0.16)	0.303	-0.15, 0.48
Habit	9 to 10	**0.19 (0.1)**	**0.054**	**-0.003, 0.38**	**0.32 (0.11)**	**0.004**	**0.105, 0.54**
	11 to 13	**0.29 (0.13)**	**0.021**	**0.05, 0.54**	**0.32 (0.13)**	**0.014**	**0.06, 0.58**
	14 to 15	**0.36 (0.09)**	**0.000**	**0.18, 0.55**	**0.46 (0.13)**	**0.000**	**0.21, 0.71**

Self-efficacy	9 to 10	0.19 (0.12)	0.111	-0.043, 0.42	**0.21 (0.1)**	**0.044**	**0.006, 0.41**
	11 to 13	**0.25 (0.11)**	**0.030**	**0.024, 0.47**	0.02 (0.06)	0.755	-0.106, 0.15
	14 to 15	0.1 (0.07)	0.174	-0.045, 0.25	**0.23 (0.11)**	**0.046**	**0.004, 0.45**
PBC	9 to 10	0.03 (0.07)	0.658	-0.102, 0.16	0.01 (0.06)	0.853	-0.113, 0.14
	11 to 13	-0.01 (0.1)	0.919	-0.203, 0.18	0.04 (0.05)	0.477	-0.064, 0.14
	14 to 15	0.03 (0.07)	0.718	-0.112, 0.16	0.08 (0.09)	0.409	-0.104, 0.26

SE: standard errors in parentheses. PBC: perceived behavioural control. Coefficient values for intake are the effect on portions from the change in one standard deviation from the mean of the scales. Coefficient values of intention are the change in standard deviations in the intention scale from the change in one standard deviation from the mean of the explanatory variables.

Discussion

The present study examined the role of affective attitude and self-identity as predictors of intention, and of habit and intention as predictors of consumption of fruit and vegetable in children. The study looked at differences in the influence of these predictors in three age groups spanning young children and adolescents; controlling for social influence, perceived behavioural control, self-efficacy and cognitive attitude according to the TIB. When jointly considering affective attitude and cognitive attitude, affective attitude was more important in predicting fruit and vegetables intentions than cognitive attitude, although the importance of these constructs by age did not show a consistent pattern. Another significant finding was the importance of self-concept. With only one exception (p=0.103), this construct was consistently associated with fruit intention and with vegetable intention across the different age groups. On the question of determinants of intake, habit was a more important predictor of intake compared to intention for the different age groups.

Several studies with adults have established the importance of affective attitude to the prediction of intentions for a range of health protective and risk behaviours, including fruit and vegetable consumption (Mark Conner, et al., 2015; French, et al., 2005; Rhodes, Fiala, & Conner, 2009). Affective attitude was associated with positive intentions to consume fruit, more so than instrumental attitudes (de Bruijn, Wiedemann, & Rhodes, 2014). Similarly, the study of Lawton, Conner and McEachan (2009) found that affective attitudes were significantly stronger predictors of intention than cognitive attitudes when looking at consumption of fruit and vegetable intentions. Using a sample of university and older high school students, the study of Canova (2016) also found that affective attitude was significantly related to fruit and vegetable intentions. For the most part, results for this study mirrored findings for adult samples and provided support for the hypothesis that affective attitude was a more important factor than cognitive attitude in discriminating non-intenders from those who intended to eat two or more portions of fruit/vegetables a day. Interventions to improve children's intentions should therefore aim to inspire a sense of enjoyment from eating fruit and vegetable. Persuasion-based interventions could include messages highlighting aspects of the sensory properties of FV as one way to incorporate affective factors in messages directed at children (Letarte, DubÉ, & Troche, 1997); going beyond mentions of taste and covering also texture, aroma, juiciness, freshness and appearance. The latter point being of particular relevance for the case of vegetable intentions (Martins, Pelchat, & Pliner, 1997; Zeinstra, Renes, Koelen, Kok, & de Graaf, 2010). Other interventions targeting affective attitudes could include aspects of behavioural mode, such as pairing FV intake with personal consumption "rituals" (Kathleen, Yajin, Francesca, & Michael, 2013); and behavioural context, such as outdoor versus indoor eating occasions (Plante, et al., 2007).

It was expected that with age the importance for intentions of cognitive attitude would increase. However, this upward gradient with age was not strictly observed, as this factor was a more relevant predictor of intention only when comparing 14 to 15 year-olds with children in the two younger groups, and only for fruit. According to prevalent theories of cognitive development, it is by this age that children have developed logical and hypothetical reasoning skills (Miller, 2011) that would improve their ability to discern the importance to themselves of the consequences of eating FV, increasing the relevance of cognitive attitude to forming intentions (Triandis, 1977). A similar argument could explain the difference between fruit and vegetables. The consequences that children of this age may value from eating fruits and vegetables, such as consequences to appearance and weight control (Paisley & Sparks, 1998; Stevenson, Doherty, Barnett, Muldoon, & Trew, 2007), may be more easily attributable to fruit. It may be easier for children to mentally invoke the consequences of eating fruit compared to the consequences of eating vegetables because fruit is usually eaten as a snack or dessert and therefore an easier substitute for more energetic foods, or because children have more experience with self-catering for fruit than with vegetables. A suggestion from the above results is that health- or benefit-based messages to improve intentions are likely to be most effective only for older age groups, and more effective for fruit than for vegetables.

Self-concept has been found to make independent contributions to the explanation of food intention in studies with adults using social cognition models (Sparks & Shepherd, 1992; Sparks, Shepherd, Wieringa, & Zimmermanns, 1995), but work with children is scarce. The findings from this study support Stevenson's et al. (2007) conclusion based on focus groups with adolescents of a relevant role for self-concept as a healthy eater in discriminating children who willingly engage in healthy eating from those who do not. The present data illustrate the importance of also considering the construct of self-concept for young children's FV intention. Kamath et al.'s (2008) meta-analysis of behavioural interventions to improve children's healthy eating indicated that, so far, this variable may have been overlooked in interventions with children. Taking into account self-concept and the motivations underlying self-concept categorizations (Stets & Burke, 2000) could therefore point to potentially novel interventions to improving children's FV intention from instilling these self-concepts or activating existing positive self-concepts. Opportunities for making voluntary commitments to a future behaviour and exercising free choice could be potential avenues for developing healthy eating self-concepts in children since one possible way in which self-concept is constructed is from the self-attributions people make about their choices and behaviours (Lokhorst, Werner, Staats, van Dijk, & Gale, 2013). Examples of this approach include making written commitments and pledges may arise during community or school activities to raise awareness of FV and promote intake (e.g. "5-a-Day week"; cooking clubs; etc.), or letting children choose a new healthy food when doing the food shopping (Wansink, 2010). Another potential approach is to

promote healthier diets by invoking a positive self-concept, though, for example, carefully crafted intervention messages (e.g. Bryan, Master, & Walton, 2014).

For both fruit and vegetables habit was a more important predictor of intake than intentions, providing support for similar findings in other work with children (Kremers & Brug, 2008; Reinaerts, et al., 2007). By age groups, habit had the strongest effect in 14 to 15 year-olds. Intention is hypothesised in the TIB to be more relevant for novel, "unlearned" behaviours, and for familiar behaviours in challenging circumstances (Ouellette and Wood 1998; Triandis 1977), therefore one possibility is that, with age acting as a factor in exposure to FV, older children would have greater opportunity of FV becoming repetitive and therefore habitual. Overall, results suggest that interventions to improve children's FV intake should incorporate elements of FV habit formation to improve children's FV consumption, as well as identify and deploy the contingencies that activate existing positive FV habits. Habit formation should theoretically benefit from encouraging FV uptake in a stable context over a sufficiently long period of time. Following this line of thought, a series of experimental studies have explored the use of small incentives (e.g. $0.25 tokens) to promote FV habits in elementary school children with some promising results (Belot, James, & Nolen, 2013; Just & Price, 2013; Loewenstein, Price, & Volpp, 2016). Following a different route, habitual responses could be stimulated from understanding and using the situational cues and cues arising from other actions that can trigger automatic food choices. One example from Cornwell and McAlister (2013) found that serving water with a meal served to increase children's vegetable intake. Similarly, carefully planning meal options in a school canteen using well-established food pairing rules favouring vegetables (e.g. Contento, Williams, Michela, & Franklin, 2006) may result in children more frequently serving themselves and eating vegetables.

The variable capturing children's ability to report on parental FV intake showed negative associations with intentions to eat vegetables for all age groups. The variable could be reflecting the fact that parents of children that have low FV intake may exercise more encouragement or pressure, i.e. stronger norms (e.g. Galloway, Fiorito, Francis, & Birch, 2006; Wardle, Carnell, & Cooke, 2005). This could also explain the negative coefficients on the injunctive norm indicator variables. In contrast, being able to report if friends eat FV was positively associated with vegetable intention. This is likely capturing the effect of idiosyncratic motivations for healthy eating, i.e. that children attend to the vegetable intake of their friends because they are interested in this themselves. Moreover, there was a positive gradient with age for this relationship, which follows expectations of greater importance of peer influences as children grow up (Doherty & Hughes, 2009). Finally, self-efficacy showed significant relationships with intake for some age groups and mainly for vegetables. The latter is in contrast with previous findings of a stronger relationship of self-efficacy with fruit intake (De Bourdeaudhuij, et al., 2008) and merits further investigation.

An important strength of this study is its focus on previously understudied influences on both fruit and vegetables intention and intake, and their potential influence for children of different age groups. This broader scope, however, introduced some limitations that are important to consider when interpreting results. Mainly, the reliance on single item scales to assess the TIB constructs impacted on their reliability and reduced the ability of variables to show associations (Armitage & Conner, 2000; Coolican, 1999). The decision to opt for single-item scales as opposed to multi-item scales was based on the trade-off between better precision and questionnaire length, given the age of participants and the effects of the latter on respondent motivation and data quality. This reflects the challenges of attempting to measure in younger populations all the components of more complete models of behaviour, such as the TIB, in already complex contexts such as food intake. In order to address this limitation, the decision was made to focus on specific relationships of interest within the wider framework of the theoretical model. This meant excluding the multiplicative effects prescribed in the TIB between intention, habit and facilitating factors. Potentially related to this complexity was the fact that, compared to the other two age groups, there were few correlates of intention and behaviour for 9 to 10 years-olds. Although important efforts were made to adapt the questionnaire to this age group, it may be that other measurement methods are necessary to best adapt these models to younger children (e.g. Araújo-Soares, et al., 2015).

The use of self-report scales to measure intake could have resulted in overestimates of the relationships among variables (e.g. Mark Conner & Armitage, 1998). A strong relationship between self-concept and intention such as the one observed in this work could be reflecting associations between past behaviour and intention, since children could be mentally referring to what they usually do to establish the type of person they are (Mark Conner & McMillan, 1999; Gardner, de Bruijn, & Lally, 2011). Efforts were made to minimize this effect by controlling for intake in the intention model and through the choice of the self-concept measure for this study, since measures of importance of an attitude object tap more fundamental sources of motivation than just past behaviour such as personal needs and values (Engel, Blackwell, & Miniard, 1995: 420). In these data around 30% of answers to the normative (injunctive and descriptive) behaviour of friends were non-responses. Large non-response rates for questions on peers' behaviours and attitudes have also been reported previously. For example, Lally et al. (2011) report 50% non-response as "acceptable" in their work on the effect of social influences on adolescents' food intake; and more recently, Pedersen, Grønhøj and Thøgersen (2015) reported missing rates of 57% and 82% on adolescents' answers to FV descriptive and injunctive social norm measures, respectively. It is likely that children will always encounter difficulties in answering this type of items if they do not feel confident in their ability to report on the behaviour and opinions of friends when faced with questions that require certain specificity like the ones used here. Although the TIB does not postulate this link, an important question for future work is the potential direct independent impact of self-concept on behaviour.

Previous studies have documented the impact of measures of self-concept on behaviour (after controlling for past behaviour and intentions), albeit the strength of the relationship tends to be lower compared to that between self-concept and intentions (Åstr⊘sm & Rise, 2001; V. Carfora, Caso, & Conner, 2015; Fishbein & Ajzen, 2010), and careful construct design needs to be considered to avoid capturing behavioural descriptions rather than salient self-schemas.

In conclusion, this study provides new evidence for children's FV consumption on the importance of self-concept and affective attitudes to promoting intentions to eat the recommended daily quantities of FV, and further evidence on the importance of habit to FV intake. Interestingly these factors were important for both young children and adolescents. Future research should explore how best to instil and develop these influences in interventions aimed at improving young people's FV intentions and intake.

References

Ajzen, I. (1985). From intentions to actions: a theory of planned behavior. In J. Kuhl & J. Beckmann (Eds.), *Action-control: from cognition to behavior*. Berlin and New York: Springer-Verlag.

Ajzen, I. (2002). Constructing a Theory of Planned Behaviour questionnaire. Available from: *http://people.umass.edu/aizen/pdf/tpb.measurement.pdf*.

Ajzen, I. (2002). Perceived Behavioral Control, Self-Efficacy, Locus of Control, and the Theory of Planned Behavior. *Journal of Applied Social Psychology, 32*, 665-683.

Ajzen, I., & Fishbein, M. (1970). The prediction of behavior from attitudinal and normative variables. *Journal of experimental social Psychology, 6*, 466-487.

Albani, V., Butler, L. T., Traill, W. B., & Kennedy, O. B. (2017). Fruit and vegetable intake: change with age across childhood and adolescence. *British Journal of Nutrition*, 1-7.

Araújo-Soares, V., Sniehotta, F. F., Laing, C. M., Gellert, P., Jackson, D., & Speakman, J. R. (2015). Social cognitions measured in 4 to 6 year olds are predictive of objectively measured physical activity. *Psychology & Health, 30*, 1240-1257.

Armitage, C. J., & Conner, M. (2000). Social cognition models and health behaviour: A structured review. *Psychology and Health, 15*, 173-189.

Åstr⊘sm, A. N., & Rise, J. (2001). Young adults' intention to eat healthy food: Extending the theory of planned behaviour. *Psychology & Health, 16*, 223-237.

Backman, D. R., Haddad, E. H., Lee, J. W., Johnston, P. K., & Hodgkin, G. E. (2002). Psychosocial predictors of healthful dietary behavior in adolescents. *Journal of Nutrition Education and Behavior, 34*, 184-193.

Bates, B., Cox, L., Nicholson, S., Page, P., Prentice, A., Steer, T., & Swan, G. (2016). *National Diet and Nutrition Survey Results from Years 5 and 6 (combined) of the Rolling Programme (2012/2013 – 2013/2014)*. London: Public Health England.

Belot, M., James, J., & Nolen, P. (2013). Changing eating habits. A field experiment in primary schools. In *SIRE Discussion Papers*. Edinburgh: University of Edinburgh.

Berenson, G. S., Srinivasan, S. R., Bao, W., Newman, W. P., Tracy, R. E., & Wattigney, W. A. (1998). Association between multiple cardiovascular risk factors and atherosclerosis in children and young adults. *New England journal of medicine, 338*, 1650-1656.

Bisogni, C. A., Connors, M., Devine, C. M., & Sobal, J. (2002). Who we are and how we eat: a qualitative study of identities in food choice. *Journal of Nutrition Education and Behavior, 34*, 128-139.

Borrmann, A., & Mensink, G. B. M. (2015). Obst- und Gemüsekonsum von Kindern und Jugendlichen in Deutschland. *Bundesgesundheitsblatt - Gesundheitsforschung - Gesundheitsschutz, 58*, 1005-1014.

Bower, J. A., & Sandall, L. (2002). Children as consumers – snacking behaviour in primary school children. *International Journal of Consumer Studies, 26*, 15-26.

Boyd, B., & Wandersman, A. (1991). Predicting Undergraduate Condom Use with the Fishbein and Ajzen and the Triandis Attitude-Behavior Models: Implications for Public Health Interventions1. *Journal of Applied Social Psychology, 21*, 1810-1830.

Bratman, M. (1992). What is intention? In P. R. Cohen, J. Morgan & M. E. Pollack (Eds.), *Intentions in Communication* (pp. 1-31). Cambridge, MA: The MIT Press.

Bridges, S., et al. (2012). Health Survey for England 2012: Trend Tables. In R. Craig & J. Mindell (Eds.), *The Health Survey for England 2012*. Leeds: The Health and Social Care Information Centre.

Bryan, C. J., Master, A., & Walton, G. M. (2014). "Helping" Versus "Being a Helper": Invoking the Self to Increase Helping in Young Children. *Child Development, 85*, 1836-1842.

Canova, L., & Manganelli, A. (2016). Fruit and vegetables consumption as snacks among young people. The role of descriptive norm and habit in the Theory of Planned Behavior. *TPM: Testing, Psychometrics, Methodology in Applied Psychology, 23,* 83-97.

Carfora, V., Caso, D., & Conner, M. (2015). The role of self-identity in predicting fruit and vegetable intake. *Appetite, 106*, 23-29.

Carfora, V., Caso, D., & Conner, M. (2016). Randomized controlled trial of a messaging intervention to increase fruit and vegetable intake in adolescents: Affective versus instrumental messages. *British Journal of Health Psychology, 21*, 937-955.

Caso, D., Carfora, V., & Conner, M. T. (2016). Predicting intentions and consumption of fruit and vegetables in Italian adolescents. Effects of anticipated regret and self-identity. *Psicologia sociale, 11*, 319-326.

Cohen, J. B., & Areni, C. S. (1991). Affect and consumer behavior. In T. S. Robertson & H. K. Kassarjian (Eds.), *Handbook of consumer behavior* (pp. 188-233). Englewood Cliffs, New Jersey: Prentice-Hall.

Conner, M., & Armitage, C. (2002). *The social psychology of food*. Philadelphia, Pa: Open University Press.

Conner, M., & Armitage, C. J. (1998). Extending the theory of planned behavior: A review and avenues for further research. *Journal of Applied Social Psychology, 28*, 1429-1464.

Conner, M., McEachan, R., Taylor, N., O'Hara, J., & Lawton, R. (2015). Role of affective attitudes and anticipated affective reactions in predicting health behaviors. *Health Psychology, 34*, 642-652.

Conner, M., & McMillan, B. (1999). Interaction effects in the theory of planned behaviour: Studying cannabis use. *British Journal of Social Psychology, 38*, 195-222.

Contento, I. R., Williams, S. S., Michela, J. L., & Franklin, A. B. (2006). Understanding the food choice process of adolescents in the context of family and friends. *Journal of Adolescent Health, 38*, 575-582.

Coolican, H. (1999). *Research methods and statistics in psychology*. London: Hodder & Stoughton.

Cornwell, T. B., & McAlister, A. R. (2013). Contingent choice. Exploring the relationship between sweetened beverages and vegetable consumption. *Appetite, 62*, 203-208.

Corwin, S. J., Sargent, R. G., Rheaume, C. E., & Saunders, R. P. (1999). Dietary behaviors among fourth graders: a social cognitive theory study approach. *American Journal of Health Behavior, 23*, 182-197.

Craigie, A. M., Lake, A. A., Kelly, S. A., Adamson, A. J., & Mathers, J. C. (2011). Tracking of obesity-related behaviours from childhood to adulthood: A systematic review. *Maturitas, 70*, 266-284.

Cullen, K. W., Baranowski, T., Baranowski, J., Hebert, D., & de Moor, C. (1999). Pilot study of the validity and reliability of brief fruit, juice and vegetable screeners among inner city African-American boys and 17 to 20 year old adults. *Journal of the American College of Nutrition, 18*, 442-450.

Dauchet, L., Amouyel, P., & Dallongeville, J. (2009). Fruits, vegetables and coronary heart disease. *Nature Reviews Cardiology, 6*, 599-608.

De Bourdeaudhuij, I., Te Velde, S., Brug, J., Due, P., Wind, M., Sandvik, C., Maes, L., Wolf, A., Rodrigo, C. P., & Yngve, A. (2008). Personal, social and environmental predictors of daily fruit and vegetable intake in 11-year-old children in nine European countries. *European Journal of Clinical Nutrition, 62*, 834-841.

de Bruijn, G.-J., Wiedemann, A., & Rhodes, R. E. (2014). An investigation into the relevance of action planning, theory of planned behaviour concepts, and automaticity for fruit intake action control. *British Journal of Health Psychology, 19*, 652-669.

Dennison, C. M., & Shepherd, R. (1995). Adolescent food choice: an application of the theory of planned behaviour. *Journal of Human Nutrition and Dietetics, 8*, 9-23.

Diep, C. S., Chen, T.-A., Davies, V. F., Baranowski, J. C., & Baranowski, T. (2014). Influence of Behavioral Theory on Fruit and Vegetable Intervention Effectiveness Among Children: A Meta-Analysis. *Journal of Nutrition Education and Behavior, 46*, 506-546.

Doherty, J., & Hughes, M. (2009). *Child development : theory and practice 0-11*. Harlow: Pearson Longman.

Domel, S. B., Thompson, W. O., Davis, H. C., Baranowski, T., Leonard, S. B., & Baranowski, J. (1996). Psychosocial predictors of fruit and vegetable consumption among elementary school children. *Health Education Research, 11*, 299-308.

Engel, J., Blackwell, R., & Miniard, P. (1995). *Consumer behavior. 8th Edition*. New York: The Dryden Press.

Feola, G., & Binder, C. R. (2010). Towards an improved understanding of farmers' behaviour: The integrative agent-centred (IAC) framework. *Ecological economics, 69*, 2323-2333.

Fernandes-Machado, S., Gellert, P., Goncalves, S., Sniehotta, F. F., & Araujo-Soares, V. (2016). Social cognitions about food choice in children aged five to eight years: Feasibility and predictive validity of an age appropriate measurement. *Appetite, 105*, 144-150.

Fischhoff, B. (2008). Assessing adolescent decision-making competence. *Developmental review, 28*, 12-28.

Fishbein, M., & Ajzen, I. (2010). *Predicting and changing behavior. The Reasoned Action approach*. New York: Routledge Taylor and Francis Group.

Fowler, F. J. (1995). *Improving survey questions: design and evaluation*. Thousand Oaks, CA: SAGE Publications Incorporated.

French, D. P., Sutton, S., Hennings, S. J., Mitchell, J., Wareham, N. J., Griffin, S., Hardeman, W., & Kinmonth, A. L. (2005). The importance of affective beliefs and attitudes in the Theory of Planned Behavior: Predicting intention to increase physical activity. *Journal of Applied Social Psychology, 35*, 1824-1848.

Galloway, A. T., Fiorito, L. M., Francis, L. A., & Birch, L. L. (2006). 'Finish your soup': counterproductive effects of pressuring children to eat on intake and affect. *Appetite, 46*, 318-323.

Gardner, B., de Bruijn, G.-J., & Lally, P. (2011). A systematic review and meta-analysis of applications of the self-report habit index to nutrition and physical activity behaviours. *Annals of Behavioral Medicine, 42*, 174-187.

Gardner, B., de Bruijn, G. J., & Lally, P. (2012). Habit, identity, and repetitive action: A prospective study of binge-drinking in UK students. *British Journal of Health Psychology, 17*, 565-581.

Garen, J. (1984). The Returns to Schooling: A Selectivity Bias Approach with a Continuous Choice Variable. *Econometrica, 52*, 1199-1218.

Geller, K. S., & Dzewaltowski, D. A. (2009). Longitudinal and cross-sectional influences on youth fruit and vegetable consumption. *Nutrition Reviews, 67*, 65-76.

Granner, M. L., Sargent, R. G., Calderon, K. S., Hussey, J. R., Evans, A. E., & Watkins, K. W. (2004). Factors of fruit and vegetable intake by race, gender, and age among young adolescents. *Journal of Nutrition Education and Behavior, 36*, 173-180.

Greene, W. H. (2008). *Econometric Analysis*: Pearson Education.

Guillaumie, L., Godin, G., & Vézina-Im, L.-A. (2010). Psychosocial determinants of fruit and vegetable intake in adult population: a systematic review. *International Journal of Behavioral Nutrition and Physical Activity, 7*, 1-12.

Herbert, G. (2010). *Designing and evaluating a theory-based, targeted print education intervention to increase young adult's fruit and vegetable intake.* Unpublished PhD thesis. University of Reading, UK.

Just, D. R., & Price, J. (2013). Using incentives to encourage healthy eating in children. *Journal of Human resources, 48*, 855-872.

Kamath, C. C., Vickers, K. S., Ehrlich, A., McGovern, L., Johnson, J., Singhal, V., Paulo, R., Hettinger, A., Erwin, P. J., & Montori, V. M. (2008). Behavioral interventions to prevent childhood obesity: a systematic review and metaanalyses of randomized trials. *The Journal of Clinical Endocrinology & Metabolism, 93*, 4606-4615.

Kathleen, D. V., Yajin, W., Francesca, G., & Michael, I. N. (2013). Rituals Enhance Consumption. *Psychological Science, 24*, 1714-1721.

Kim, S. A., Moore, L. V., Galuska, D., Wright, A. P., Harris, D., Grummer-Strawn, L. M., Merlo, C. L., Nihiser, A. J., & Rhodes, D. G. (2014). Vital signs: fruit and vegetable intake among children - United States. *Morbidity and Mortality Weekly Report (MMWR), 63*, 671-676.

Kirscht, J. P. (1983). Preventive health behavior: A review of research and issues. *Health Psychology, 2*, 277-301.

Köster, E. P., & Mojet, J. (2007). Theories of food choice development. In L. Frewer & H. v. Trijp (Eds.), *Understanding consumers of food products* (pp. 93-124). Cambridge: Woodhead Publishing Ltd.

Kremers, S. P. J., & Brug, J. (2008). Habit Strength of Physical Activity and Sedentary Behavior among Children and Adolescents. *Pediatric Exercise Science, 20*, 5-17.

Kristjansdottir, A. G., Thorsdottir, I., De Bourdeaudhuij, I., Due, P., Wind, M., & Klepp, K.-I. (2006). Determinants of fruit and vegetable intake among 11-year-old

schoolchildren in a country of traditionally low fruit and vegetable consumption. *International Journal of Behavioral Nutrition and Physical Activity, 3*, 41-50.

Krosnick, J. A., Holbrook, A. L., Berent, M. K., Carson, R. T., Hanemann, W. M., Kopp, R. J., Mitchell, R. C., Presser, S., Ruud, P. A., & Smith, V. K. (2002). The impact of "no opinion" response options on data quality: non-attitude reduction or an invitation to satisfice? *Public Opinion Quarterly, 66*, 371-403.

Lally, P., Bartle, N., & Wardle, J. (2011). Social norms and diet in adolescents. *Appetite, 57*, 623-627.

Lawton, R., Conner, M., & McEachan, R. (2009). Desire or reason: Predicting health behaviors from affective and cognitive attitudes. *Health Psychology, 28*, 56-65.

Letarte, A., DubÉ, L., & Troche, V. (1997). Similarities and Differences in Affective and Cognitive Origins of Food Likings and Dislikes. *Appetite, 28*, 115-129.

Lien, N., Lytle, L., A. , & Komro, K., A. . (2002). Applying Theory of Planned Behavior to fruit and vegetable consumption of young adolescents. *American Journal of Health Promotion, 16*, 189-197.

Loewenstein, G., Price, J., & Volpp, K. (2016). Habit formation in children: Evidence from incentives for healthy eating. *Journal of health economics, 45*, 47-54.

Lokhorst, A. M., Werner, C., Staats, H., van Dijk, E., & Gale, J. L. (2013). Commitment and behavior change: A meta-analysis and critical review of commitment-making strategies in environmental research. *Environment and behavior, 45*, 3-34.

Lowe, R., Eves, F., & Carroll, D. (2002). The influence of affective and instrumental beliefs on exercise intentions and behavior: A longitudinal analysis. *Journal of Applied Social Psychology, 32*, 1241-1252.

Marcia, J. E. (2001). Identity in childhood and adolescence. *International Encyclopedia of the Social & Behavioral Sciences*, 7159–7163.

Markus, H. (1977). Self-schemata and processing information about the self. *Journal of personality and social psychology, 35*, 63-78.

Marsh, H. W., Ellis, L. A., & Craven, R. G. (2002). How do preschool children feel about themselves? Unraveling measurement and multidimensional self-concept structure. *Developmental psychology, 38*, 376-393.

Martens, M. K., van Assema, P., & Brug, J. (2005). Why do adolescents eat what they eat? Personal and social environmental predictors of fruit, snack and breakfast consumption among 12–14-year-old Dutch students. *Public Health Nutrition, 8*, 1258-1265.

Martins, Y., Pelchat, M. L., & Pliner, P. (1997). “Try it; it's good and it's good for you ”: Effects of Taste and Nutrition Information on Willingness to Try Novel Foods. *Appetite, 28*, 89-102.

McClain, A. D., Chappuis, C., Nguyen-Rodriguez, S. T., Yaroch, A. L., & Spruijt-Metz, D. (2009). Psychosocial correlates of eating behavior in children and adolescents: a review. *International Journal of Behavioral Nutrition and Physical Activity, 6*, 54-74.

Michela, J. L., & Contento, I. R. (1986). Cognitive, motivational, social, and environmental influences on children's food choices. *Health Psychology, 5*, 209-230.

Michela, J. L., & Wood, J. V. (1986). Causal attributions in health and illness. In P. C. Kendall (Ed.), *Advances in cognitive-behavioral research and therapy* (pp. 179-325). New York: Academic.

Miller, P. M. (2011). Piaget's theory. Past, present and future. In U. Goswami (Ed.), *Blackwell handbook of childhood cognitive development* (pp. 649-671). Chichester: Wiley-Blackwell.

Montano, D. E. (1986). Predicting and understanding influenza vaccination behavior: alternatives to the health belief model. *Medical care*, 438-453.

Morland, K., Wing, S., & Roux, A. D. (2002). The Contextual Effect of the Local Food Environment on Residents' Diets: The Atherosclerosis Risk in Communities Study. *American Journal of Public Health, 92,* 1761-1768.

Murnaghan, D. A., Blanchard, C. M., Rodgers, W. M., LaRosa, J. N., MacQuarrie, C. R., MacLellan, D. L., & Gray, B. J. (2010). Predictors of physical activity, healthy eating and being smoke-free in teens: A theory of planned behaviour approach. *Psychology & Health, 25,* 925-941.

Neumark-Sztainer, D., Story, M., Perry, C., & Casey, M. A. (1999). Factors influencing food choices of adolescents: findings from focus-group discussions with adolescents. *Journal of the American Dietetic Association, 99,* 929-937.

Nguyen, S. P., Gordon, C. L., & McCullough, M. B. (2011). Not as easy as pie. Disentangling the theoretical and applied components of children's health knowledge. *Appetite, 56,* 265-268.

Nicklaus, S., & Issanchou, S. (2007). Children and food choice. In L. Frewer & H. v. Trijp (Eds.), *Understanding consumers of food products* (pp. 329-350). Cambridge: Woodhead Publishing Limited.

Paisley, C. M., & Sparks, P. (1998). Expectations of reducing fat intake: The role of perceived need within the theory of planned behaviour. *Psychology and Health, 13,* 341-353.

Patrick, H., & Nicklas, T. A. (2005). A Review of Family and Social Determinants of Children's Eating Patterns and Diet Quality. *Journal of the American College of Nutrition, 24,* 83-92.

Pearson, N., Biddle, S. J. H., & Gorely, T. (2009). Family correlates of fruit and vegetable consumption in children and adolescents: a systematic review. *Public Health Nutrition, 12,* 267-283.

Pedersen, S., Grønhøj, A., & Thøgersen, J. (2015). Following family or friends. Social norms in adolescent healthy eating. *Appetite, 86,* 54-60.

Plante, T. G., Gores, C., Brecht, C., Carrow, J., Imbs, A., & Willemsen, E. (2007). Does Exercise Environment Enhance the Psychological Benefits of Exercise for Women? . *International Journal of Stress Management, 14,* 88-98.

Povey, R., Conner, M., Sparks, P., James, R., & Shepherd, R. (2000a). Application of the Theory of Planned Behaviour to two dietary behaviours: Roles of perceived control and self-efficacy. *British Journal of Health Psychology, 5,* 121-139.

Povey, R., Conner, M., Sparks, P., James, R., & Shepherd, R. (2000b). The theory of planned behaviour and healthy eating: Examining additive and moderating effects of social influence variables. *Psychology & Health, 14,* 991-1006.

Prynne, C. J., Mishra, G. D., O'Connell, M. A., Muniz, G., Laskey, M. A., Yan, L., Prentice, A., & Ginty, F. (2006). Fruit and vegetable intakes and bone mineral status: a cross-sectional study in 5 age and sex cohorts. *The American Journal of Clinical Nutrition, 83,* 1420-1428.

Reinaerts, E., de Nooijer, J., Candel, M., & de Vries, N. (2007). Explaining school children's fruit and vegetable consumption: the contributions of availability, accessibility, exposure, parental consumption and habit in addition to psychosocial factors. *Appetite, 48,* 248-258.

Resnicow, K., Davis-Hearn, M., Smith, M., Baranowski, T., Lin, L. S., Baranowski, J., Doyle, C., & Wang, D. T. (1997). Social-cognitive predictors of fruit and vegetable intake in children. *Health Psychology, 16,* 272-276.

Reynolds, K. D., Hinton, A. W., Shewchuk, R. M., & Hickey, C. A. (1999). Social cognitive model of fruit and vegetable consumption in elementary school children. *Journal of Nutrition Education, 31,* 23-30.

Rhodes, R. E., Fiala, B., & Conner, M. (2009). A review and meta-analysis of affective judgments and physical activity in adult populations. *Annals of Behavioral Medicine, 38*, 180-204.

Rise, J., Sheeran, P., & Hukkelberg, S. (2010). The Role of Self-identity in the Theory of Planned Behavior: A Meta-Analysis. *Journal of Applied Social Psychology, 40*, 1085-1105.

Sparks, P., & Shepherd, R. (1992). Self-Identity and the Theory of Planned Behavior: Assesing the Role of Identification with "Green Consumerism". *Social Psychology Quarterly, 55*, 388-399.

Sparks, P., Shepherd, R., Wieringa, N., & Zimmermanns, N. (1995). Perceived behavioural control, unrealistic optimism and dietary change: An exploratory study. *Appetite, 24*, 243-255.

Spruijt-Metz, D. (1995). Personal incentives as determinants of adolescent health behavior: The meaning of behavior. *Health Education Research, 10*, 355-364.

Spruijt-Metz, D. (1999). *Adolescence, affect and health*. Hove: Psychology Press.

StataCorp. (2015). *Stata Statistical Software: Release 14*. College Station, TX: StataCorp LP.

Steinberg, L. (2005). Cognitive and affective development in adolescence. *Trends in cognitive sciences, 9*, 69-74.

Steinberg, L., Graham, S., O'Brien, L., Woolard, J., Cauffman, E., & Banich, M. (2009). Age Differences in Future Orientation and Delay Discounting. *Child Development, 80*, 28-44.

Stets, J. E., & Burke, P. J. (2000). Identity Theory and Social Identity Theory. *Social Psychology Quarterly, 63*, 224-237.

Stevenson, C., Doherty, G., Barnett, J., Muldoon, O. T., & Trew, K. (2007). Adolescents' views of food and eating: Identifying barriers to healthy eating. *Journal of Adolescence, 30*, 417-434.

The Market Research Society. (2006). *Occupation groupings: a job dictionary. 6th edition*. London, UK: The Market Research Society.

Tilston, C. H., Gregson, K., Neale, R. J., & Douglas, C. J. (1991). Dietary awareness of primary school children. *British Food Journal, 93*, 25-29.

Triandis, H. C. (1977). *Interpersonal Behavior*. Monterrey, CA: Brooks/Cole.

Triandis, H. C. (1980). Values, attitudes and interpersonal behaviour. In H. E. J. Howe (Ed.), *1979 Nebraska symposium on motivation: beliefs, attitudes and values*. Lincoln/London: University of Nebraska Press.

Truswell, A. S., & Darnton-Hill, I. (1981). Food habits of adolescents. *Nutrition Reviews, 39*, 73-88.

Valois, P., Desharnais, R., & Godin, G. (1988). A comparison of the Fishbein and Ajzen and the Triandis attitudinal models for the prediction of exercise intention and behavior. *Journal of Behavioral Medicine, 11*, 459-472.

Van Der Horst, K., Oenema, A., Ferreira, I., Wendel-Vos, W., Giskes, K., van Lenthe, F., & Brug, J. (2007). A systematic review of environmental correlates of obesity-related dietary behaviors in youth. *Health Education Research, 22*, 203-226.

van't Riet, J., Sijtsema, S. J., Dagevos, H., & De Bruijn, G.-J. (2011). The importance of habits in eating behaviour. An overview and recommendations for future research. *Appetite, 57*, 585-596.

Vereecken, C. A., Van Damme, W., & Maes, L. (2005). Measuring attitudes, self-efficacy, and social and environmental influences on fruit and vegetable consumption of 11- and 12-year-old children: reliability and validity. *Journal of the American Dietetic Association, 105*, 257-261.

Verplanken, B., & Orbell, S. (2003). Reflections on Past Behavior: A Self-Report Index of Habit Strength1. *Journal of Applied Social Psychology, 33*, 1313-1330.

Wansink, B. (2010). *Mindless eating. Why we eat more than we think*. London: Hay House.

Wardle, J., Carnell, S., & Cooke, L. (2005). Parental control over feeding and children's fruit and vegetable intake: How are they related? *Journal of the American Dietetic Association, 105*, 227-232.

Wilson, D. K., Friend, R., Teasley, N., Green, S., Reaves, I. L., & Sica, D. A. (2002). Motivational versus social cognitive interventions for promoting fruit and vegetable intake and physical activity in African American adolescents. *Annals of Behavioral Medicine, 24*, 310-319.

Wood, W., & Neal, D. T. (2009). The habitual consumer. *Journal of Consumer Psychology, 19*, 579-592.

Yngve, A., Wolf, A., Poortvliet, E., Elmadfa, I., Brug, J., Ehrenblad, B., Franchini, B., Haraldsdóttir, J., Krølner, R., & Maes, L. (2005). Fruit and vegetable intake in a sample of 11-year-old children in 9 European countries: The Pro Children Cross-sectional Survey. *Annals of Nutrition and Metabolism, 49*, 236-245.

Zabinski, M. F., Daly, T., Norman, G. J., Rupp, J. W., Calfas, K. J., Sallis, J. F., & Patrick, K. (2006). Psychosocial correlates of fruit, vegetable, and dietary fat intake among adolescent boys and girls. *Journal of the American Dietetic Association, 106*, 814-821.

Zeinstra, G. G., Renes, R. J., Koelen, M. A., Kok, F. J., & de Graaf, C. (2010). Offering choice and its effect on Dutch children's liking and consumption of vegetables: a randomized controlled trial. *The American Journal of Clinical Nutrition, 91*, 349-356.